California Environmental Protection Agency

Air Resources Board

**Vapor Recovery Compliance Test Procedure**

# PROPOSED TP-201.1C

# Pressure Integrity of Drop Tube/Drain Valve Assembly

**Adopted:**_____

Note: All text is proposed for adoption. As authorized title 2, California Code of Regulations, section 8, underline to indicate addition or adoption of the regulations is omitted.

# California Environmental Protection Agency
# Air Resources Board

# Vapor Recovery Test Procedure

# TP-201.1C

# Pressure Integrity Of Drop Tube/Drain Valve Assembly

Definitions common to all certification and test procedures are in:

**D-200 Definitions for Vapor Recovery Procedures**

For the purpose of this procedure, the term "CARB" refers to the California Air Resources Board, and the term "Executive Officer" refers to the CARB Executive Officer, or his or her authorized representative or designate.

## 1. PURPOSE AND APPLICABILITY

**1.1** The purpose of this procedure is to quantify the pressure integrity of both a drop tube and drain valve seal when a drop tube is installed below a spill containment bucket on a two-point Phase I system. This procedure is used during certification and to determine compliance of equipment at installed at gasoline dispensing facilities with the performance specification for the maximum allowable leakrate as defined in the Certification Procedure CP-201.

## 2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

**2.1** A compatible product cap is modified to allow the introduction of nitrogen into a Phase I drop tube. A pressure-measuring device is connected to the modified cap. If the resulting measured nitrogen flowrate necessary to maintain a steady-state pressure of 2.00 inches $H_2O$ is less than, or equal to, the maximum allowable leakrate the Drop Tube/Drain Valve Assembly is verified to be in compliance.

**2.2** If the introduction of nitrogen, at a flowrate equal to the maximum allowable leakrate does not result in a steady state pressure that meets, or exceeds, the limits specified in CP-201, the Phase I product adaptor shall be inspected and tested. Any leaks attributable to the Phase I product adaptor shall be corrected and the test repeated to ensure the measured pressure versus flowrate is attributable only to the Drop Tube/Drain Valve Assembly.

## 3. BIASES AND INTERFERENCES

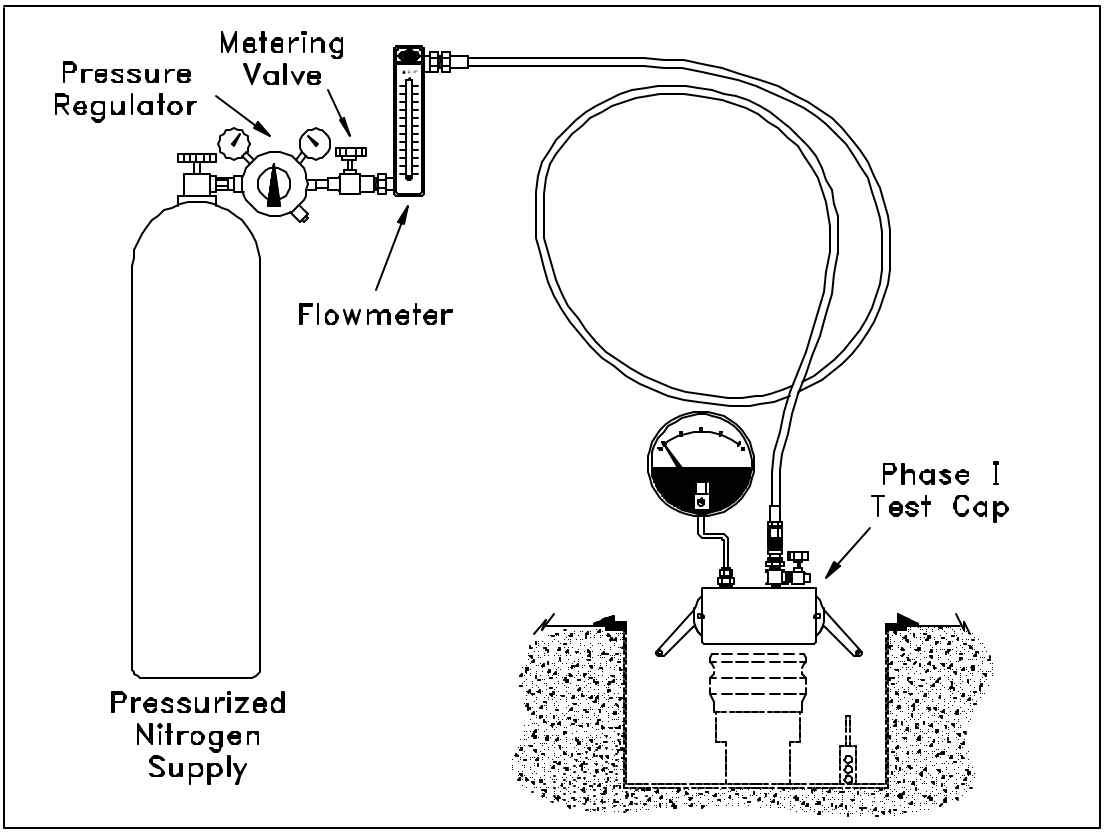
**3.1** Missing or defective gaskets on the Phase I product adaptor, or a loose adaptor, may bias the results towards noncompliance. This bias is eliminated by testing the Phase I product adaptor for leaks prior to final determination of the compliance status of the Drop Tube/Drain Valve Assembly.

**3.2** Refueling during the test may bias the results. No vehicle refueling or bulk deliveries to any of the tanks at the facility shall occur during this test.

**3.3** Product levels less than four (4) inches above the highest opening at the bottom of the submerged drop tube may bias the test toward noncompliance.

**3.4** Leaks in the test equipment will bias the results toward noncompliance. Prior to conducting the test, this bias is eliminated by conducting a leak check of the test equipment leak detection solution may also be used during the test to verify the absence of leaks in the test equipment.

**Figure 1**
**Pressure Introduction Assembly**



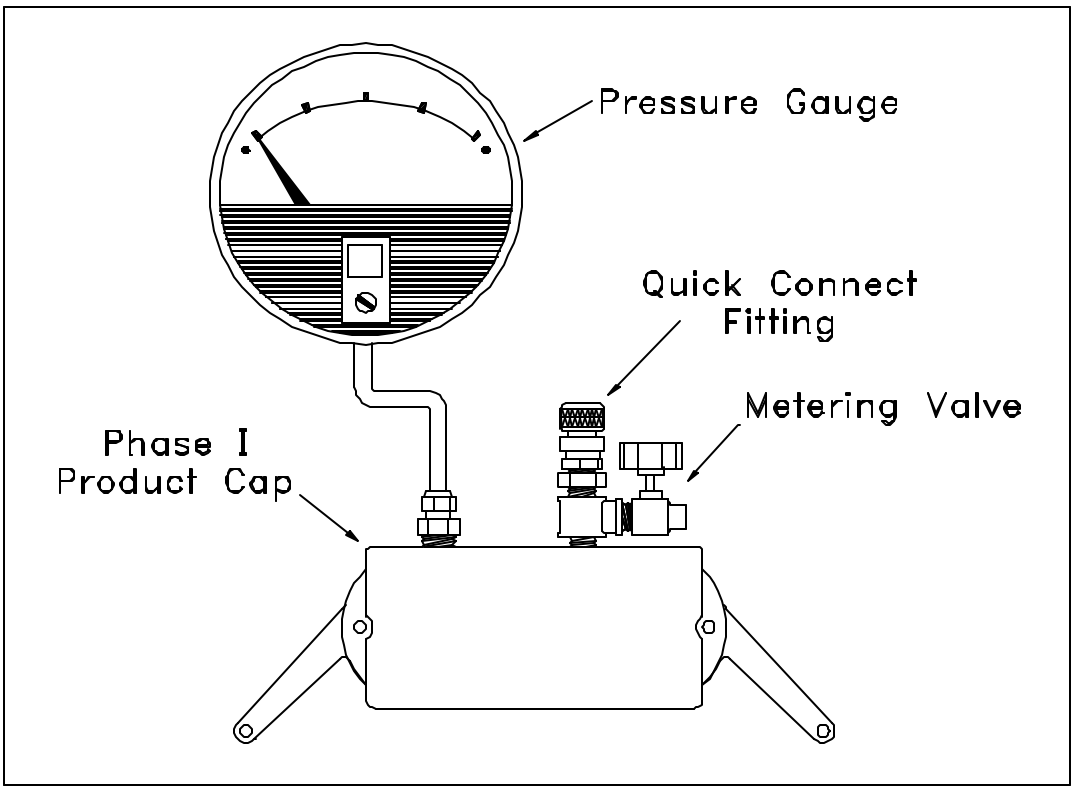

**3.5** Use of this procedure to quantify the leak rate of containment box drain valves that drain liquid into the ullage of the storage tank, rather than into the drop tube, will yield invalid results.

## 4. SENSITIVITY, RANGE, AND PRECISION

**4.1** The measurable leakrate is dependent upon the range of the flowmeter used for the test. The recommended flowmeter range specified in Section 5.1 provides sufficient precision at the maximum allowable leakrate defined in CP-201.

**4.2** The sensitivity of the pressure measuring device is 0.01 inches $H_2O$ for electronic pressure measuring devices and 0.05 inches $H_2O$ for mechanical pressure gauges.

**Figure 2**
**Product Cap Test Assembly**




## 5. EQUIPMENT

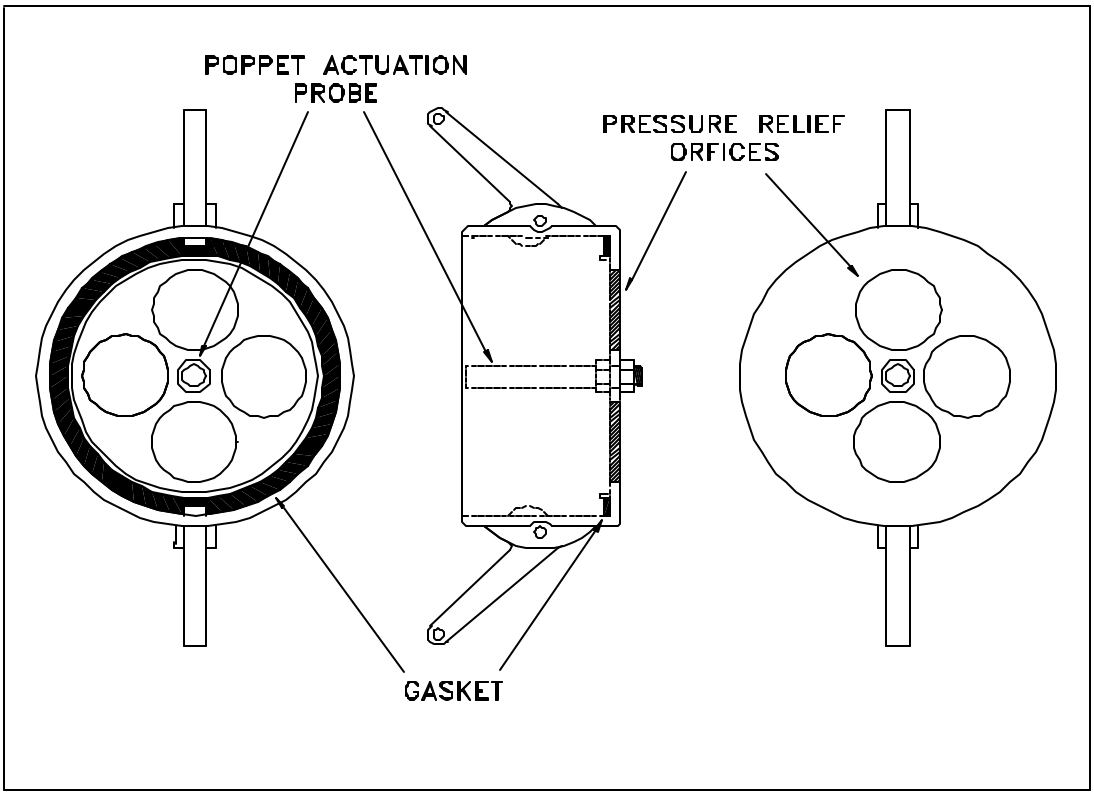
**5.1** Pressure Introduction Assembly. Use a product cap compatible with the Phase I product adaptor. The cap shall be equipped with a pressure tap and flowmeter capable of measuring flowrates equal to the maximum allowable leakrate. The maximum allowable full-scale range for the flowmeter shall be 1.00 CFH. The flowmeter shall be calibrated for use with nitrogen. As a safety precaution, the hose used to feed nitrogen into the assembly shall be steel braided, or a separate grounding strap may be used. An example of a complete Pressure Introduction Assembly is shown in Figure 1. An example of a Product Cap Test Assembly is shown in Figure 2.

**5.2** Pressure Measuring Device. Use a pressure-measuring device to monitor the pressure in the drop tube.

5.2.1 If an electronic pressure-measuring device is used, the maximum full scale range of the device shall be 10 inches $H_2O$. The minimum accuracy shall be 0.5 percent and the pressure measuring device shall be readable to the nearest 0.01 inches $H_2O$.

5.2.2 If a mechanical pressure-measuring device is used, the maximum fullscale range shall be 5 inches $H_2O$. The minimum accuracy shall be 1.0 percent and the minimum graduations shall be 0.05 inches $H_2O$. The minimum diameter of the pressure gauge face shall be 4 inches.

**Figure 3**
**Vapor Poppet Pressure Relief Assembly**




**5.3** Nitrogen. Use commercial grade gaseous nitrogen in a high-pressure cylinder, equipped with a two-stage pressure regulator and a one psig pressure relief valve.

**5.4** Stopwatch. Use a stopwatch accurate to within 0.2 seconds to time the duration of the test.

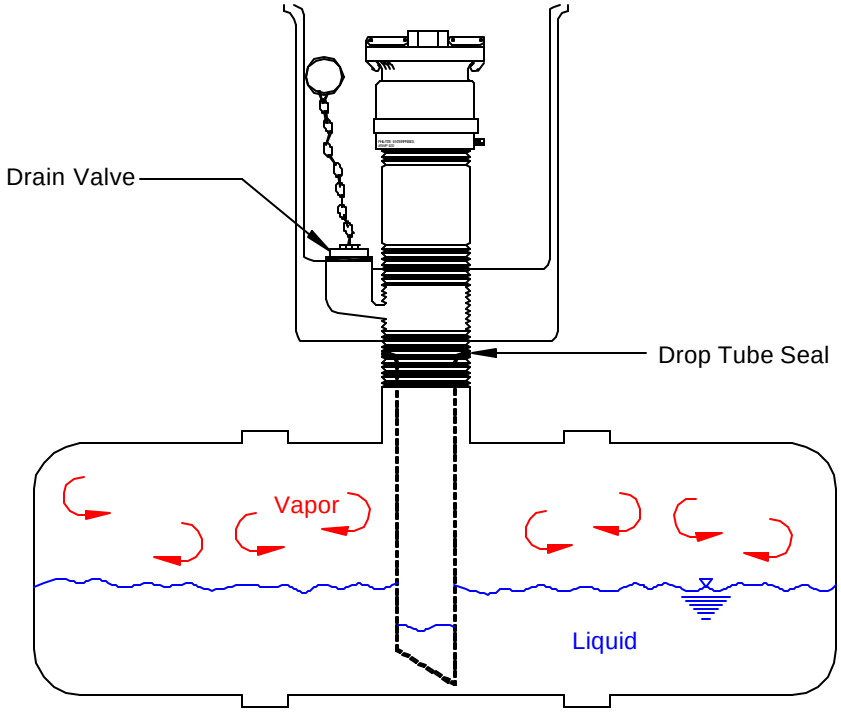
**5.5** Leak Detection Solution. Any commercial liquid solution designed to detect vapor leaks may be used to verify the pressure integrity of the Phase I product adaptor during this test.

**5.6** Vapor Poppet Pressure Relief Assembly. Use an assembly to open the Phase I vapor poppet during testing. This will ensure that the underground storage tank (UST) ullage and liquid surface is at zero gauge pressure. An example of a Vapor Poppet Pressure Relief Assembly is shown in Figure 3.

**5.7** Traffic Cones. Use traffic cones to encircle the area containing the Phase I spill containment buckets while the test is being conducted.

**5.8** Tank Gauging Stick. Use a tank gauging stick of sufficient length to verify that the UST liquid level is at least four (4) inches above the highest opening at the bottom of the submerged drop tube. The tank gauging stick shall be equipped with a non-sparking "L" bracket at the end.

**Figure 3**
**Drain Valve Configured to Drain into Drop Tube**




## 6. PRE-TEST PROCEDURES

**6.1** The flowmeter and pressure-measuring device shall be calibrated within the 180 days prior to conducting the test. The flowmeter(s) shall be calibrated for use with nitrogen. Calibrations shall be conducted in accordance with EPA or CARB protocols. CARB calibration methodology for flow meters are contained in Appendix D of Air Monitoring Quality Assurance, Volume VI, Standard Operating Procedures for Stationary Source Emission Monitoring and Testing, January 1979.

**6.2** Place the traffic cones around the perimeter of the Phase I spill containment buckets, allowing sufficient space to safely conduct the test.

**6.3** Remove the lids of the Phase I spill containment buckets. Visually determine that the drop tube is installed below the spill containment bucket and that the drain path allows liquid to drain directly into the drop tube.

**6.4** Inspect the Phase I product adaptor to ensure that the gasket is intact and that the adaptor is securely attached to the Phase I product stem.

**6.5** Verify that the liquid level in the storage tank is at least four (4) inches above the highest opening at the bottom of the submerged drop tube using the tank gauging stick.

**6.6** Inspect the drain valve configuration. Verify that the drain valve drains liquid directly into the drop tube above the Overfill Prevention device, as shown in Figure 4, rather than into the underground storage tank ullage space. If the drain valve drains into the underground tank ullage space, this procedure will only quantify the leak rate through the connections.

## 7. TEST PROCEDURE

**7.1** Connect the Pressure Introduction Assembly to the Phase I product drop tube as shown in Figure 1. Connect the nitrogen supply line to the inlet of the flowmeter.

**7.2** Connect the Vapor Poppet Pressure Relief Assembly to the Phase I vapor poppet to bring the UST headspace to atmospheric pressure.

**7.3** With no vehicle refueling occurring, open the nitrogen supply and adjust the nitrogen flowrate to at least three times the maximum allowable leakrate specified in CP-201, and start the stopwatch.

**7.4** Wait until the pressure measuring device records a pressure between 2.00 and 2.20 inches $H_2O$.

7.4.1 If the pressure does not reach at least 2.00 inches $H_2O$ within 90 seconds, the Drop Tube/Drain Valve Assembly does not comply with the maximum allowable leakrate.

7.4.2 If the pressure reaches at least 2.00 inches $H_2O$, reduce the introduction of nitrogen to the allowable leakrate specified in CP-201. Wait until the pressure reaches steady state conditions for at least ten (10) seconds and record both the nitrogen flowrate and the steady state pressure. If the steady state pressure is less than 2.00 inches $H_2O$, the Drop Tube/Drain Valve Assembly does not comply with the maximum allowable leakrate.

7.4.3 If the Drop Tube/Drain Valve Assembly does not reach the minimum specified pressure, use a soap solution on the rotatable adaptor to check for leaks at the rotation mechanism or the adaptor seal.

## 8. POST-TEST PROCEDURES

**8.1** Remove the Pressure Introduction Assembly and the Vapor Poppet Pressure Relief Assembly from the Phase I connections. Replace the caps on the appropriate Phase I adaptors, and the lids on the appropriate spill containment buckets.

**8.2** Remove the traffic cones from the Phase I area.

**8.3** If the steady-state pressure, at a nitrogen flowrate rate equal to the allowable leakrate, was not equal to or greater than 2.00 inches $H_2O$, Equation 9-1 may be used to determine the leakrate at 2.00 inches $H_2O$.

## 9. CALCULATING RESULTS

**9.1** If the flowrate of Nitrogen was at the upper limit of the flowmeter and the measured pressure never reached 2.00 inches $H_20$, but was greater than 0.0 inches $H_2O$, the actual leakrate at a pressure of 2.00 inches $H_2O$ shall be calculated as follows:

$$Q_{2.00} = (2.00)^{1/2}\left[\frac{Q_{actual}}{(P_{actual})^{1/2}}\right] \qquad \textbf{Equation 9-1}$$

Where:

$Q_{2.00}$ = The leakrate of the drop tube assembly at 2.00 inches $H_2O$, cubic feet per hour
$Q_{actual}$ = The actual introduction rate of nitrogen, cubic feet per hour
$P_{actual}$ = The actual measured steady-state pressure at $Q_{actual}$, inches $H_2O$
2.00 = Pressure, inches $H_2O$

## 10. REPORTING RESULTS

**10.1** Report the results of the quantification of the leakrate through the Drop Tube/Drain Valve Assembly as shown on Form 1.

## 11. ALTERNATE PROCEDURES

**11.1** This procedure shall be conducted as specified. Modifications to this test procedure shall not be used to determine compliance unless prior written approval has been obtained from the CARB Executive Officer, pursuant to Section 14 of Certification Procedure CP-201.

**Form 1**

**Field Data Sheet**

**Pressure Integrity Of Drop Tube/Drain Valve Assembly**

| | | |
|---|---|---|
| Facility: | Test Date: | Tester(s): |
| Address: | City: | Zip Code: |
| Phase I System Type: | Phase II System Type: | |
| Date of Last Flowmeter Calibration: | Date of Last Pressure Device Calibration: | |

## Test Results

| Product Grade | Nitrogen Flowrate (CFH) | Pressure (inches $H_20$) | Make/Model Spill Containment Bucket | Make/Model Rotatable Product Adapter | Make/Model Rotatable Vapor Adapter |
|---|---|---|---|---|---|
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